CLAIMS

Having thus described the invention, what is claimed is:

1. In a sheet lifter and separator for lifting and separating the uppermost sheet of a stack of workpieces from the sheet disposed therebelow, the combination comprising:

(a) a lifter including a frame and a multiplicity of suction holders spaced thereabout with working surfaces at their lower ends to engage the sheet, at least one of said suction holders being disposed adjacent one side of said frame and thereby of the uppermost workpiece; and

(b) conduit means coupled to said holders and adapted to be coupled to a vacuum source to draw air from said holders and thereby secure the sheet thereto, said at least one holder adjacent said one side being operable to bend the edge portion of the sheet adjacent said one side upwardly from the plane defined by the working surfaces of others of said holders spaced further inwardly from said one side.

2. A sheet lifter and separator in accordance with Claim 1 wherein said at least one holder adjacent said one side includes at least a first holder spaced at a first close distance to said one side and a second holder spaced at a second

greater distance inwardly from said one side, each of said holders having a suction holder sleeve provided on a suction holder base, said suction holder sleeve of said first holder being compressible to a greater extent than that of said second holder by the vacuum applied in the direction of the workpiece surface, said differential in compression producing a differential in vertical height to said working surface.

3. A sheet lifter and separator in accordance with Claim 2 wherein said sleeves are of a bellows-type configuration provided by multiple folds with said first holder having a greater number of folds than the sleeve of said second holder.

4. A sheet lifter and separator in accordance with Claim 2 wherein said first and second holders are disposed along an imaginary connecting line running perpendicular to the edge of the workpiece and wherein there is included at least one workpiece stop spaced further from said one side along said imaginary line to limit upward movement of the workpiece during the bending process.

5. A sheet lifter and separator in accordance with Claim 1 wherein said at least one holder is uncoupled from other holders placed on the outermost workpiece in the stack.

6. A sheet lifter and separator in accordance with Claim 1 wherein said at least one suction holder is disposed on a support structure that is moveable relative said lifter frame.

7. A sheet lifter and separator in accordance with Claim 6 wherein said support structure is a separator frame pivotally supported on said lifter frame, said at least one suction holder is pivoted thereby from a position in which it is aligned with the suction holders on said lifter frame to a position upwardly therefrom.

8. A sheet lifter and separator in accordance with Claim 7 wherein said separator frame pivots relative to said lifter frame the about an axis that is parallel to said one side of said lifter frame.

9. A sheet lifter and separator in accordance with Claim 1 wherein there are included at least one separator nozzle mounted on said frame adjacent said one side and a conduit connected thereto and adapted to be coupled to a source of pressurized air, whereby pressurized air can be released in the direction of the edge of the workpieces to facilitate separation of the uppermost sheet.

10. A sheet lifter and separator in accordance with Claim 9 including means for releasing the pressurized air in pulses.

11. A sheet lifter and separator in accordance with Claim 9 wherein there are a multiplicity of separator nozzles in staggered relationship along the one side of the frame assigned to the suction separators.

12. A sheet lifter and separator for lifting and separating the uppermost sheet of a stack of workpieces from the sheet disposed therebelow comprising:

(a) a lifter including a frame and a multiplicity of suction holders spaced thereabout;

(b) a separator along one side of said lifter frame and including a frame having an end spaced from said one side of said lifter frame and pivoted on said frame for pivotal motion between a horizontal position and a position angled upwardly, said separator frame supporting a multiplicity of separator holders at positions adjacent said one side and spaced therefrom, said lifter holders and said separator holders having nozzles with working surfaces at their lower ends;

(c) conduits extending from said suction holders and adapted to be connected to a vacuum source;

(d) drive means for moving said lifter frame upwardly and downwardly relative to a stack of workpieces disposed therebelow and said control means operative to move said holder frame downwardly to a position in which said lifter holders grip the topmost sheet of the stack and lift it upwardly, said control means also being operative to bring the separator holders against the topmost sheet and engage the sheet adjacent said one side and thereafter to pivot the separator frame upwardly to vary the vertical position of the nozzles of said separator holders relative to the position of the nozzles of said lifter holders to bend the one side of the topmost sheet and cause the one side of the topmost sheet to separate from the sheet adhered to its lower surface;

(f) drive means for pivoting said separator frame; and

(g) control means for the vacuum source and drive means.

13. A sheet lifter and separator in accordance with Claim 12 wherein said holders on said separator include at least a first holder spaced at a first close distance to said one side

and a second holder spaced at a second greater distance each of said holders having a suction holder sleeve provided on a suction holder base, said suction holder sleeve of said first holder being compressible by the vacuum to a greater extent than that of said second holder to provide a differential in vertical height to said working surfaces.

14. A sheet lifter and separator in accordance with Claim 13 wherein said sleeves are of a bellows-type configuration provided by multiple folds with said first holder having a greater number of folds than the sleeve of said second holder.

15. A sheet lifter and separator in accordance with Claim 13 wherein said first and second holders are disposed along an imaginary connecting line running perpendicular to the edge of the workpiece and wherein there is included at least one workpiece stop spaced further from said one side along said imaginary line to limit upward movement of the workpiece during the bending process.

16. A sheet lifter and separator in accordance with Claim 12 wherein said separator frame pivots relative to said lifter frame the about an axis that is parallel to said one side of said lifter frame.

17. A sheet lifter and separator in accordance with Claim 12 wherein there are included at least one separator nozzle mounted on said lifter frame adjacent said one side and a conduit connected thereto and adapted to be coupled to a source of pressurized air, whereby pressurized air can be released in the direction of the edge of the workpieces to facilitate separation of the uppermost sheet.

18. A sheet lifter and separator in accordance with Claim 17 including means for releasing the pressurized air in pulses.

19. A sheet lifter and separator in accordance with Claim 17 wherein there are a multiplicity of separator nozzles in staggered relationship along the one side of the frame assigned to the suction separators.